

What is claimed is:

1. A safety shut-off valve, comprising:

a valve housing;

a detachable end portion connected to said valve housing by a region of reduced

5 strength;

a valve element disposed within said valve housing and being displaceable between an open position that permits flow through the valve and a closed position that

substantially prevents flow through the valve;

a biasing element engaged with said valve element to urge said valve element

10 toward said closed position; and

a retainer element disposed within said valve housing and engaged between said valve element and said detachable end portion to initially maintain said valve element in said open position; and

wherein imposition of a force onto said detachable end portion results in at least  
15 partial detachment from said valve housing along said region of reduced strength, said at least partial detachment causing at least a portion of said retainer element to disengage said detachable end portion to permit said biasing element to displace said valve element toward said closed position.

20 2. The safety shut-off valve of claim 1, wherein said retainer element includes a plurality of arm segments engaged against said detachable end portion adjacent said region of reduced strength to initially maintain said valve element in said open position,

said at least partial detachment causing at least one of said plurality of arm segments to disengage said detachable end portion to permit said biasing element to displace said valve element toward said closed position.

5           3.       The safety shut-off valve of claim 2, wherein said detachable end portion includes a shoulder extending about an inner periphery adjacent said region of reduced strength, said plurality of arm segments abutting said shoulder to initially maintain said valve element in said open position, said at least partial detachment causing at least one of said plurality of arm segments to disengage said shoulder to permit said biasing element to  
10       displace said valve element toward said closed position.

          4.       The safety shut-off valve of claim 3, wherein said shoulder extends entirely about said inner periphery to define an annular shoulder.

15           5.       The safety shut-off valve of claim 2, wherein said retainer element includes at least three of said arm segments positioned uniformly about said inner periphery.

          6.       The safety shut-off valve of claim 5, wherein said retainer element includes four of said arm segments positioned uniformly about said inner periphery.

20           7.       The safety shut-off valve of claim 2, wherein said disengagement of said at least one of said plurality of arm segments from said detachable end portion causes

deformation of said plurality of arm segments remaining in engagement with said detachable end portion to permit said biasing element to displace said valve element toward said closed position.

5           8.     The safety shut-off valve of claim 1, wherein said disengagement of said at least a portion of said retainer element from said detachable end portion causes deformation of said retainer element to permit said biasing element to displace said valve element toward said closed position.

10           9.     The safety shut-off valve of claim 8, wherein said deformation comprises buckling.

15           10.    The safety shut-off valve of claim 1, wherein said at least partial detachment of said detachable end portion results from said valve housing is caused by fracturing along said region of reduced strength.

20           11.    The safety shut-off valve of claim 1, wherein said imposition of force onto said detachable end portion results in complete detachment from said valve housing along said region of reduced strength, said complete detachment causing said retainer element to disengage said detachable end portion to allow expulsion of said retainer element from said valve housing and permit said biasing element to displace said valve element toward said closed position.

12. The safety shut-off valve of claim 1, wherein said region of reduced strength is formed by a groove extending about an outer periphery of said detachable end portion.

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13. The safety shut-off valve of claim 1, wherein said region of reduced strength is formed by a narrowed wall thickness.

14. The safety shut-off valve of claim 1, wherein said retainer element has a cup-like configuration.

15. A safety shut-off valve, comprising:  
a valve housing including a passage defined by an inner periphery;  
a detachable end portion connected to said valve housing by a region of reduced strength;

a valve element sized and shaped to be guidably displaced by said inner periphery along said passage between an open position that permits flow through the valve and a closed position that substantially prevents flow through the valve;

a biasing element engaged with said valve element to urge said valve element toward said closed position;

a retainer element engaged between said valve element and said detachable end portion to initially maintain said valve element in said open position; and

wherein imposition of a force onto said detachable end portion results in at least partial detachment from said valve housing along said region of reduced strength, said at least partial detachment causing at least a portion of said retainer element to disengage said detachable end portion to permit said biasing element to displace said valve element toward said closed position.

16. The safety shut-off valve of claim 15, wherein said valve element is a spherical-shaped ball.

17. The safety shut-off valve of claim 16, wherein said inner periphery has a substantially circular cross-section.

18. The safety shut-off valve of claim 17, wherein said substantially circular cross section defines an inner diameter, said ball defining an outer diameter sized in close tolerance with said inner diameter.

19. The safety shut-off valve of claim 15, wherein said passage extends along an axis, said valve housing defining at least one lateral opening in communication with said passage, said at least one lateral opening disposed between said valve element and said detachable end portion when said valve element is in said open position to permit flow between said passage and said at least one lateral opening.

20. The safety shut-off valve of claim 15, wherein a portion of the valve adjacent said region of reduced strength defines external threads engagable with a corresponding threaded opening in a tank wall with said region of reduced strength positioned adjacent an exterior surface of said tank wall.

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21. The safety shut-off valve of claim 20, wherein said detachable end portion comprises at least two flats to aid in threading the valve into said threaded opening in said tank wall.

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22. The safety shut-off valve of claim 21, wherein said detachable end portion has a hexagonal configuration.

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23. The safety shut-off valve of claim 15, wherein said retainer element includes a plurality of arm segments engaged against said detachable end portion adjacent said region of reduced strength to initially maintain said valve element in said open position, said at least partial detachment causing at least one of said plurality of arm segments to disengage said detachable end portion to permit said biasing element to displace said valve element toward said closed position.

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24. The safety shut-off valve of claim 23, wherein said detachable end portion includes a shoulder extending about an inner periphery thereof adjacent said region of reduced strength, said plurality of arm segments abutting said shoulder to initially maintain

said valve element in said open position, said at least partial detachment causing at least one of said plurality of arm segments to disengage said shoulder to permit said biasing element to displace said valve element toward said closed position.

5           25.     A safety shut-off valve, comprising:

          a valve housing including an axial passage bound by an inner circumferential surface, and an annular valve seat extending inwardly from said inner circumferential surface;

          a detachable end portion connected to said valve housing by a region of reduced strength and including an annular shoulder disposed adjacent said region of reduced strength;

          a ball element sized in close tolerance with said inner circumferential surface and being guidably displaceable along said axial passage between an open position remote from said valve seat and a closed position abutting said valve seat;

15           a spring element engaged between said valve housing and said ball element to urge said ball element toward said closed position; and

          an retainer element including a plurality of arm segments, said retainer element being disposed between said ball element and said detachable end portion with said plurality of arm segments abutting said annular shoulder to initially maintain said ball element in said open position; and

20           wherein imposition of a force onto said detachable end portion results in at least partial detachment from said valve housing along said region of reduced strength, said at

least partial detachment causing at least one of said plurality of arm segments to disengage said annular shoulder to permit said spring element to displace said ball element toward said closed position.

5           26.     The safety shut-off valve of claim 25, wherein said valve housing includes at least one lateral opening in communication with said axial passage and positioned between said ball element and said valve seat when said ball element is in said open position.

10           27.     The safety shut-off valve of claim 25, wherein said retainer element includes four of said arm segments positioned uniformly about said annular shoulder.

15           28.     The safety shut-off valve of claim 25, wherein said disengagement of said at least one of said plurality of arm segments from said annular shoulder causes deformation of said plurality of arm segments remaining in engagement with said annular shoulder to permit said spring element to displace said ball element toward said closed position.

20           29.     The safety shut-off valve of claim 28, wherein said deformation comprises buckling.

          30.     The safety shut-off valve of claim 25, wherein said imposition of force onto said detachable end portion results in complete detachment from said valve housing along



